LABORATÓRIO DE INSTRUMENTAÇÃO
E FÍSICA EXPERIMENTAL DE PARTÍCULAS
partículas e tecnologia

RADART

RAdiation **D**osimetry to **A**dvance **R**adio**T**herapy

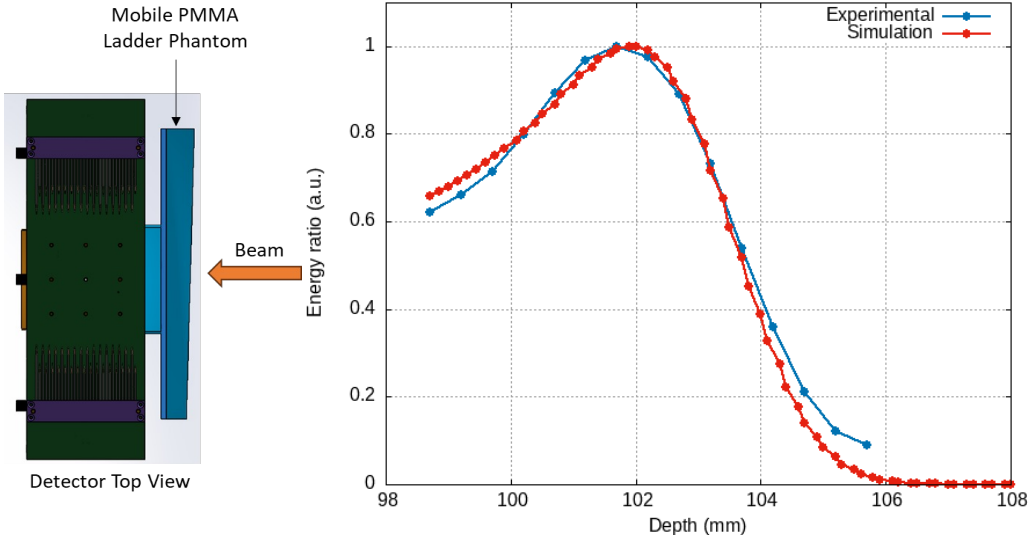
Total FTE=13.2 (Researchers=1.1)

7 Researchers
9 PhD students
9 MSc students
4 Undergraduate students/Trainees
9 External collaborators

2 Articles in int. journals
1 LIP students note
2 Int. + **5** Nat. Oral presentations
4 Int. +**2** Nat. Poster presentations
7 Student presentations
1 PhD + **6** MSc thesis finished

SPOF array for high-res. dosimetry

- Tests with x-rays (50 kV) and electrons (^{90}Sr) ☛ **JINST paper (accepted)**
- **HollandPTC campaign**

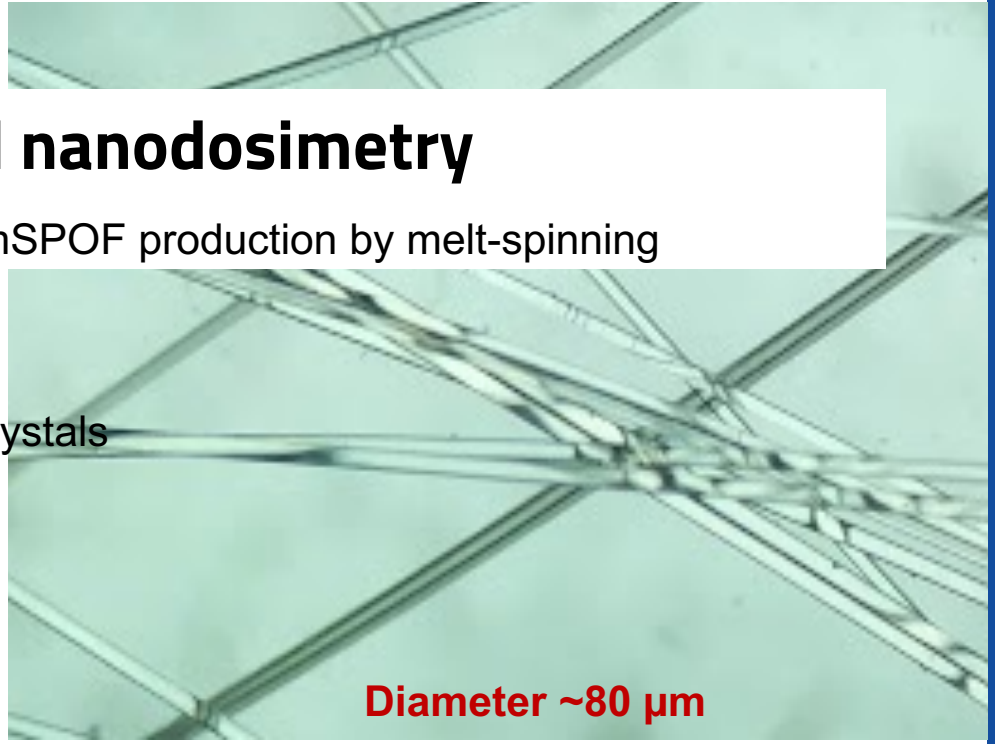


Next steps

- DAQ for high-rate events (*collab. CIEMAT*)
- Protocols for cell growth (*collab. BioISI*)

Materials for micro- and nanodosimetry

- Optimization and reproducibility of mSPOF production by melt-spinning
- Optical characterization
- Otimization of production of Al_2O_3 crystals



Next steps

- Doping (mSPOF and crystals)
- Irradiation studies (*collab. PSI+DKFZ*)

☛ **FCT-PEX project (submitted)**

Modelling radiobiological effects of NPs

- Realistic cell model MC simulations of the influence of AuNPs size, concentration and distribution in the survival fractions for a ^{60}Co source (*collab. C2TN*)

☛ **BPEX paper (published)**

- Implementation of a MKM model extension for TOPAS
- **Short-term internship at MDACC** (G. Sawakuchi group)

UTAustin Portugal

Next steps

- Model x-ray (RS 2000 irradiator) and proton (ICNAS) irradiations
- Simulate ROS production
- 2D → 3D cell models translation in targeted and radiosensitization therapy ☛ **FCT-IC&DT project (submitted)**

Advance MBRT and FLASH-RT

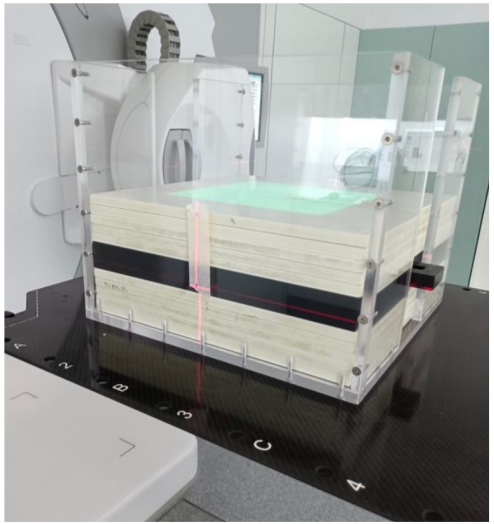
- Proof-of-concept for pMBRT on cardiac radiablation procedure (*collab. ICPO*)
- Started implementation of pMBRT setup in (GPU-based) MOQUI
- Study of H_2O_2 as surrogate of dose in MBRT (*collab. DKFZ*) ☛ **MP paper (published)**
- Implementation of MCTS pulse irradiation model (PIM) with gMicroMC in pFLASH-RT
- Proof-of-concept of IMPT FLASH-RT with MatRad toolkit ☛ **PMB paper (submitted)**

Next steps

- Further development of the MCTS-PIM model
- Apply IMPT FLASH-RT MatRad toolkit to neurinoma treatment planning

Effects of PT in NDD

- Preparation and dosimetric characterization of the proton beam line (*collab. CMAM*). Initial cell irradiation experiments with the proton beam
- Irradiation with ^{60}Co source (C2TN) and MV X-rays (HSM). Characterization of the phantom for radiobiology studies



Next steps

- Irradiation experiments (photons and protons)
- Implementation of biological assays protocols and data analysis (*collab. BioISI*)
- Assessment with Monte Carlo (TOPAS) simulations

SWOT

Strengths

- Ability to attract students.
- Collaborations with from national and international research groups.

Weaknesses

- Needs consolidate projects linked to pre-clinical and clinical research.
- Number of FTE researchers small compared with the number of students. Most senior researchers have teaching duties.

Opportunities

- > 10 new PT centres in Spain.
- New collaborations with Spanish groups: CMAM, CIEMAT, PSI, DKFZ. Consolidate collaborations with C2TN and BioISI.
- Funding from submitted projects?

Threats

- (No) plan for a PT centre in Portugal?
- The PhD thesis in collaboration with Y. Prezado was aborted. Need to reactivate collaboration (with a new student).